EE511 Class Assignment: Maximum Likelihood Estimation

1. The Poisson distribution has the form

\[ p(x|\theta) = \frac{\theta^x}{x!}e^{-\theta} \]

for \( x = 0, 1, \ldots \) and \( \theta > 0 \). Find the ML estimate for parameter \( \theta \) using:

\[ \hat{\theta}_{ML} = \arg \max_{\theta} \log p(X|\theta). \]

2. Now, use the fact that the Poisson distribution has kernel and sufficient statistic

\[ [g(s, \theta)]^{1/n} = \theta^s e^{-\theta} \quad s = \frac{1}{n} \sum_{i=1}^{n} x_i, \]

respectively, to find the ML estimate for parameter \( \theta \), i.e.,

\[ \hat{\theta}_{ML} = \arg \max_{\theta} \log g(s, \theta). \]